The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LOUIS F. APRIGLIANO
and
LESLIE K. KOHLER

Appeal No. 2004-0769
Application 09/656,017

ON BRIEF

Before GARRIS, PAK, and TIMM, Administrative Patent Judges.

GARRIS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal which involves claims 5, 6 and 9.

The subject matter on appeal relates to a method of casting a ductile alloy of a base metal and a corrosion resisting material which comprises utilizing an inert cover gas to atomize

a molten stream of the alloy into a spray of droplets for deposit onto a substrate surface to increase in strength the ductile alloy from a yield strength of less than 145 ksi. This appealed subject matter is adequately illustrated by independent claim 5, which reads as follows:

> 5. In a method of casting a ductile alloy having a base metal by heating thereof to produce a molten stream that is atomized into a spray of droplets directed onto a moving substrate surface; the improvement residing in: selecting a corrosion resisting material as a component of the alloy undergoing said heating; exclusively limiting said alloy to the base metal and the corrosion resisting material; and utilizing an inert cover gas to atomize the molten stream into said spray of droplets for deposit onto said surface to increase in strength the ductile alloy from a yield strength of less than 145 ksi.

The references set forth below are relied upon by the examiner as evidence of obviousness:

Shaw	3,635,769	Jan. 18, 1972
Jenkins et al. (Jenkins)	4,681,258	July 21, 1987
Coombs	4,779,802	Oct. 25, 1988
Nakamori et al. (Nakamori)	5,843,587	Dec. 1, 1998
Denkyoku (Japanese Kokai) (translation copy attached)	JP63-33594	Feb. 13, 1988

All of the claims on appeal are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakamori in view of either Coombs or Jenkins, or alternatively as being unpatentable

over Coombs or Jenkins in view of Nakamori or Shaw or the Japanese reference.[1]

We refer to the Brief and Reply Brief as well as to the Answer for a complete exposition of the opposing viewpoints expressed by the appellants and by the examiner concerning these rejections.

OPINION

For the reasons which follow, we will sustain the examiner's § 103 rejections of the appealed claims.

It is the examiner's basic position that it would have been obvious for one with an ordinary level of skill in the art to use an inert cover gas such as nitrogen for atomizing a molten stream into a spray of droplets onto a substrate surface in accordance with the method of, for example, Coombs, wherein

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[1] In light of the appellants' claim grouping statement on page 3 of the Brief, the appealed claims will stand or fall together as expressly observed by the examiner on page 3 of the Answer (which observation has not been contested by the appellants in the Reply Brief). Therefore, in assessing the merits of the above-noted rejections, we will focus on independent claim 5 (i.e., the broadest claim on appeal) as representing the rejected claims. See 37 CFR § 1.192(c)(7) (2002).

the molten stream constitutes a ductile alloy such as a nickel:chromium alloy in accordance with the teachings of, for example, Nakamori. This proposed combination of prior art teachings has not been contested by the appellants with any reasonable specificity in the Brief or Reply Brief. Instead, the appellants argue that "claims 5, 6 and 9 patentably distinguish over all of the prior art references since none of them even refers to an increase in yield strength of the ductile alloy to some specified extent or degree" (Reply Brief, page 2).[2] This argument is unpersuasive.

Nakamori evinces that it was known in the prior art to spray molten droplets of nickel:chromium alloy of the type here claimed onto a substrate surface, and Coombs evinces that it was known in the prior art to produce a spray of molten alloy droplets by atomizing the molten alloy with the inert gas

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[2] We recognize that the appellants also refer to the improved ductility recitation in dependent claim 6. However, because this dependent claim has not been separately grouped by the appellants as previously indicated, we will not separately consider the examiner's rejection of this claim. In this regard, we remind the appellants that, in order to obtain separate consideration of commonly rejected claims, the claims must be separately grouped and separately argued. See Ex parte Schier, 21 USPQ2d 1016, 1018 (Bd. Pat. App. & Int. 1991).

nitrogen. Based on this reference evidence, a prima facie case exists for concluding that it would have been obvious to effect the step of spraying molten nickel:chromium alloy as desired by Nakamori via the technique of atomizing with nitrogen as taught by Coombs. In this way, Nakamori's spraying step would have been accomplished with a technique evinced by Coombs to be known in the prior art as imminently suitable for this purpose. Moreover, appellants do not argue otherwise as mentioned earlier.

We appreciate the appellants' point that none of the applied references "even refers to an increase in yield strength of the ductile alloy to some specified extent or degree" (Reply Brief, page 2). However, the appealed claim 5 recitation "to increase in strength the ductile alloy from a yield strength of less than 145 ksi" merely sets forth an objective or consequence of the here claimed method. Based on similarities in the method steps and alloy materials recited in claim 5 and disclosed in Nakamori and Coombs, it is reasonable to believe that the method of either Nakamori or Coombs would necessarily and inherently result in the claim 5 objective or consequence of increasing in strength the ductile alloy from a yield strength of less than

145 ksi. Stated otherwise, the record before us contains no evidence that the claim 5 result under consideration is even novel much less nonobvious (e.g., vis-á-vis unexpected) with respect to Nakamori or Coombs.

In summary, the appellants' argument presupposes, without foundation, that the result which is recited in claim 5 is both novel and nonobvious. On the other hand, it is reasonable to believe that the method of either Nakamori or Coombs would be inherently and necessarily capable of achieving this result. Certainly, the examiner's proposed combination of Nakamori and Coombs would be indisputably capable of achieving this result since the combination method and the appellants' claimed method are indistinguishable. Moreover, it is significant that the appeal record contains no evidence based on a comparison of the claim 5 method with the Nakamori or Coombs method by which to assess whether the appellants' claimed result is nonobvious or even novel.

In light of the foregoing, we will sustain the examiner's § 103 rejections of all appealed claims as being unpatentable over Nakamori in view of either Coombs or Jenkins or

alternatively as being unpatentable over Coombs or Jenkins in view of Nakamori or Shaw or the Japanese reference.[3]

The decision of the examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

BRADLEY R. GARRIS Administrative Patent Judge	)	
CHUNG K. PAK Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
CATHERINE TIMM Administrative Patent Judge	)	

BRG:psb

[3] Given the limited issue advanced by the appellants on this appeal, there is no need to discuss the Jenkins, Shaw and Japanese references.

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Japanese Published Unexamined (Kokai) Patent Publication No. S63-33594; Publication Date: February 13, 1988; Application No. S61-174835; Application Date: July 25, 1986; Int. Cl.[4]: C25D 7/06; Inventor(s): Takeshi Kusunomi et al.; Applicant: Tokushu Denkyoku Corporation; Japanese Title: Denki Aen Mekki Souchi-you Kondakuta Rooru (Conductor Roller for an Electro-galvanizing Device)

Specification

1. Title of Invention

Conductor Roller for an Electro-galvanizing Device

2. Claim(s)

1. A conductor roller for an electro-galvanizing device, characterized in that the conductor roller body is made of a composition that contains Ni and Cr at 40 to 60% each as main components.

2. A conductor roller for an electro-galvanizing device, as disclosed in Claim 1, characterized in that the conductor roller body is produced by using an electroslag casting.

3. Detailed Description of the Invention

[Field of Industrial Application]

This invention pertains to improved conductor rollers for electro-galvanizing devices. In particular, this invention relates to conductor rollers that are used in the electro-galvanizing field at iron mills.

[Prior Art]

The electro-galvanizing devices used at iron mills are equipment for producing zinc plating steel plates by a continuous electrolytic zinc plating means using cold rolling thin plates and hot rolling thin plates as raw materials. Strip steel plates in which rolling oil is completely removed by applying a predetermined pretreatment are fed into the plating devices. An acid bath is usually given. In particular, a zinc sulfate bath is widely used. Ammonium chloride and sodium chloride are added into the bath so as to reduce the bath resistance other than zinc sulfate. Aluminum sulfate is also sometimes added so as to improve the smoothness of the surfaces of the steel plates and the uniformity of the electrodeposition. As for anodes, pure zinc is conventionally used as soluble anodes. In the recent years, insoluble electrodes are used in lieu of soluble anodes because they require a replacing time. With the insoluble electrodes, zinc ions are supplied from the outside via electrolyte.

Generally, there are two types of plating tanks: a vertical type; a horizontal type. By arranging the conductors between both types, an electric conduction is applied to the strip steel plates. Since these conductor rollers are in contact with the zinc sulfate bath, electric corrosion is significant. Because the rollers are the most critical components in the electro-galvanizing devices, various studies for improving the materials and the usable life are conducted in various fields by sampling a large number of materials.

At the current technological stage, a Ni-Cr-Mo material (CVN-Ni: 63%, Cr: 18% and Mo: 17% or Inco 625-Ni: 58%, Cr: 22%, Mo: 9%, Nb: 4% and Fe: 4%) is primarily used as the material, typically as Hasteroi C (Ni: 65%; Cr: 17%; Mo: 17%).

[Problem of Prior Art to Be Addressed]

Accordingly, the producing costs for prior art conductor rollers and the materials are extremely high with respect to the structure also (12000000 yen or higher at the current price). Incorporating the maintenance fees for detachment, polishing and assembly due to electric corrosion and the limitation in the number of polishing operations, the total cost required for the rollers results in a serious problem along with high power consumption.

The present invention is developed so as to solve the problem. The invention also aims to offer a conductor roller for an electro-galvanizing device that can reduce the cost for the plating by improving the durability of the roller by improving the material thereof and that can prevent the interruption of the equipment operation by the period required for maintenance.

[Measures to Solve the Problem]

In order to achieve the purpose, the inventors of the invention first actually immerse the following materials into electrolyte, which are assumed to be strong to an acid bath. The reduction in the amounts of the materials due to corrosion is measured:

1. Electrode: insoluble electrode

2. Electrolyte: zinclyte

3. Immersing time: 33 hours

4.Sample materials (quantity indication: %)

	Ni	Cr	Mo	Co	W	Nb	Fe
Hasteroi C Inconeru 625 Inconeru	(Please refer to the original						

50Ni-50Cr 50Ni-50Cr (S-R) SUS 316L Stelyte #66	description)						

As a result, it is identified that the reduction level of the immersion is ordered from (1) Hasteroi C, (2) 50Ni-50Cr, (3) SUS 316L, (4) 50Ni-50Cr (S-R), (5) Inconeru 825, (6) Inconeru 625 to (7) Stelyte #66 from higher to lower. It is evident that Stelyte demonstrates highest corrosion resistance. However, this type of Co group materials involve an extremely high cost and demonstrate insufficient casting fitness. In contrast, 50Ni-50Cr has electrocorrosion resistance, high hardness and abrasion resistance. For these reasons, the invention adopts a conductor roller for an electro-galvanizing device, whose body is made of a composition that contains Ni and Cr at 40 to 60% each as the main components.

[Effect]

As the conductor roller body of the invention is made of the material with the above composition, it demonstrates high electrocorrosion resistance, high abrasion resistance and extremely high durability.

[Embodiment]

The embodiment of the invention is described hereinbelow with reference to an electroslag casting device as illustrated in Fig.2. In Fig.2, reference number 1 refers to a wire real; 2 to a wire; 3 to a wire feed in-out device; 4 to a nozzle; 5 to an inner casting water cooling contact metal; 6 to an outer ring water cooling contact metal; 7 to a starting block for starting an electroslag casting operation; 8 to a seat for the starting block. Seat 8

and starting block 7 are provided so as to lower at a predetermined casting speed. Reference number R refers to a conductor roller body for a sleeve electro-galvanizing device in the formation.

The following conditions are applied for the electroslag casting to produce the conductor roller of the invention using the aforementioned device:

Wire to be used	ET-NCR-50		3.2 mmφ
Flux to be used	ANF-6 (by Russia)		
Welder	RES-1	12 electrodes	Rocking type
Current	450 to 600 Amp/pole		
Voltage	40 to 45 V/pole		
Wire feeding speed	2.5 m/min		

The disadvantage of a conventional centrifugal casting such as an insufficient casting quality due to the material of 50Ni-50Cr is not seen at all in conductor roller body R that is composed of a 50Ni-50Cr composition, which is produced according to the device and the conditions. The insufficient casting quality refers to abnormal roughness and fine cracks occurred to the texture on the surface of the roller body. Thus, conductor roller body R maintains excellent quality as follow. The surface is smooth and extremely normal in terms of the texture. No impurities and gases are generated. No defects occur, such as cracks.

A comparison in the results after the 50Ni-50Cr electro-galvanizing conductor roller of the invention and prior art Ni-Cr-Mo conductor roller have been put to the practical use as references is indicated in the following table. It is evident that the conductor roller of the invention has a much higher quality in the durability than that of prior art conductor roller.

	Product of the invention	Prior art product
Polishing frequency	Once per 90 to 100 days	Once per 40 to 50 days
Number of maximum polishings	15 to 18 times	10 to 13 times
Service life	1350 to 1800 days	400 to 650 days

[Advantageous Result of the Invention]

As disclosed above, according to the electro-galvanizing device conductor roller of the invention, the durability of the roller significantly improves due to the improved material. The operation efficiency also improves because the time required for the maintenance is reduced. As a result, the cost required for the electro-galvanizing is drastically reduced. As the roller surface is smooth and normal in terms of the texture, a significantly positive effect is brought to the electro-galvanizing plating for steel plates.

Furthermore, when the electroslag casting is used for the invention, the effect further improves. It is also easier for the conductor roller to be recycled.

4. Brief Description of the Invention

The drawings illustrate the embodiment of the invention. Fig.1 is a perspective view illustrating a conductor roller body. Fig.2 is a schematic diagram illustrating a conductor roller body during a production using an electroslag casting device.

R...Conductor roller body for an electro-galvanizing device

Translations Branch
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